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GIFFORD PINCHOT, Forester.

SILVICAL LEAFLET 48.

PIGNUT HICKORY.

Hicoria glabra (Mill) Britton.

Pignut hickory is cut and marketed with shagbark (*Hicoria ovata*), mockernut (*Hicoria alba*), and big shellbark (*Hicoria laciniosa*).

The name "hickory" is applied without distinction to the wood of these four species, which furnish the bulk of the hickory of commerce. Hickory is the strongest and toughest wood which occurs in commercial quantities in North America, and is used for the spokes, rims, poles, shafts, singletrees and doubletrees of spring vehicles, the axles of heavy wagons, the handles of axes, picks, hammers, and other tools, and for many other purposes which require toughness and strength. For many of these no satisfactory substitute is known. Hickory also has the highest fuel value of any North American wood and brings from 20 to 30 per cent more on the market than other kinds. The young saplings have also been used very extensively for barrel hoops, and a hickory hoop is considered the best wooden one. Much American hickory is exported.

Of all the hickories, pignut produces the strongest and toughest wood. It has a broader sap than any other species except mockernut and a wider commercial distribution than any except shagbark; it will grow on poorer soil than will any other species except pale-leaf hickory (*Hicoria villosa*), and on good soil it attains a larger size than any other of the species except the pecan. The nuts, however, are rarely edible and are of little value except for fattening hogs.

Pignut is often known as black hickory, but the term black hickory is also applied to mockernut. The name pignut is also commonly applied to bitternut (*Hicoria minima*). This is frequently the source of much confusion, but the tree can be readily distinguished from each of these by its botanical characteristics. It is often called "switch-top hickory" on account of its slender, straight upper branches.

RANGE AND OCCURRENCE.

Pignut is distributed through most of the eastern part of the United States. The range follows closely the forty-third parallel from York County, Me., to the eastern shore of Lake Michigan, and the forty-fourth parallel across the State of Wisconsin to Lake Pepin on the Mississippi River. It extends southwesterly across Minnesota and Iowa up the Missouri River as far north as Omaha; south through eastern Kansas, eastern and central Oklahoma, and eastern Texas to the Gulf of Mexico. In the Gulf States it is found as far south as 50 or 60 miles from the coast, and in Florida its range extends to latitude 27° on the west coast and to Cape Canaveral on the east coast. Along the Atlantic coast it is commonly found on the borders of bayous and estuaries.

The important commercial range of pignut is east of the Wabash and Mississippi rivers, west of the Blue Ridge, north of Mississippi and Alabama, and in the Yazoo Delta of Mississippi. The tree reaches its best development on the less exposed slopes and the rich, moist clay soils of the Cumberland Plateau. It is common in woodlots throughout the Great Valley between the Blue Ridge and Appalachian ranges in Virginia and Tennessee and occupies the higher and drier situations of the undulating rich clay hills. On the higher ridges of the Appalachians it is small and of little importance. It is the commonest of the hickories on the hilly clay land of western Tennessee, the blue-grass regions of Kentucky, and the hilly land of southern Indiana and Ohio and western Pennsylvania, and in this region, on rather dry and heavy soils, produces timber of the finest quality, noted for its toughness and strength. It is often important and of large size in the bottomlands of western Tennessee and Mississippi, where, with an undergrowth of cane, it grows in rich, relatively well-drained alluvial soils.

CLIMATE.

In its very wide latitudinal range (from 27° to 44° north latitude) pignut is subjected to a more varied climate than is any other hickory except bitternut and shagbark. It withstands the severe climate of the North and thrives under the very different conditions in the Southern States.

The mean summer temperature experienced by pignut varies from about 66° F. in the North to 81° F. in the South. The growing season for agricultural crops between killing frosts is as short as $4\frac{1}{2}$ months in some places in the North, while at the southern limit of pignut there are often no killing frosts. In Vermont pignut has withstood a minimum temperature of -26° F., and the minimum for the coldest month averages about 9° F. The least average annual precipitation within its range is 29 inches (Michigan and Nebraska). Pignut attains its best development in the Cumberland Mountains, with an average summer temperature of 71° F., a growing season of $5\frac{1}{2}$ months, and a precipitation of 60 inches.

ASSOCIATED SPECIES.

Pignut hickory seldom grows in pure stands. It tends to form groups, however, and sometimes in rather dry situations it becomes the predominating species. It is associated more or less throughout its entire range with mockernut, which has almost the same requirements. In the Northeast it associates on dry, stony soils with chestnut oak, red, black, and scarlet oaks, chestnut, mockernut, and in better situations with these species and with white oak, white ash, and shagbark hickory.

In the Cumberland Mountains and the hilly region of the Ohio Valley pignut hickory is found chiefly on the more exposed slopes, where it associates with chestnut oak, white oak, black oak, elms, chestnut, and black gum. On the bottomlands of the South it grows on slightly elevated situations in company with white, black, and Spanish oaks, black gum, mockernut, shagbark, white ash, and sweet gum.

HABIT.

In favorable situations pignut often reaches a height of 130 or 140 feet and a maximum diameter of 3 or 4 feet. In the forest its stem is slender and straight, and at maturity clear for about one-third of the

height of the tree. It is less apt to fork within the crown than shagbark hickory and the limbs are more slender and graceful.

The bark is typically dark gray, firm, rough, and strongly ridged. The twigs are slender, first light green, and later dark brown. The terminal winter buds are short, oval, and smooth; they are smaller than the buds of shagbark, big shellbark, and mockernut, but larger than those of paleleaf, nutmeg, and water hickories. The nut is thick shelled and a little larger and slightly more elongated than that of shagbark, and the husk in which it is borne is much thinner. The kernel is commonly bitter. The leaves are compound, with from 5 to 7 leaflets arranged in pairs with a single leaflet at the end. They are smooth and free from hairs. The leaves are alternate and can thus be distinguished from those of ash.

Like all other hickories, pignut has a very strong taproot. Owing to the fact that it grows in relatively dry situations the taproot is, as a rule, even more developed in pignut than in other species. In moist places the taproot is not well developed.

SOIL AND MOISTURE.

While pignut reaches its best development in fairly moist, fertile soil, it succeeds better in drier situations than does any other hickory except paleleaf hickory; in this respect it resembles chestnut oak. It grows both on clayey and sandy soils, but the wood grown on the former is ordinarily considered superior.

TOLERANCE.

Pignut is the most tolerant of all the hickories and will stand as much shading as beech or sugar maple and still grow rapidly when released from suppression. Trees are often found making their best diameter growth after a century or more of partial suppression.

GROWTH AND LONGEVITY.

Compared with chestnut, yellow poplar, catalpa, or even with the oaks and ashes, pignut hickory is a slow-growing tree. Its rate of growth is about the same as that of shagbark, mockernut, and big shellbark hickories, but varies greatly in different regions and situations. Under favorable conditions, such as are found in the clay hills of the Ohio Valley, seedlings reach a height of about $1\frac{1}{2}$ feet in the first 5 years and grow at the rate of about 1 foot a year after that, while the diameter growth averages about 1 inch in 7 years. That is, the average maximum growth in a planted and managed stand will be about 50 feet in height and 7 inches in diameter at the end of 50 years, and 65 or 70 feet in height and 10 inches in diameter at the end of 70 years. A maximum height growth of 2 feet in one year has been observed. In an unmanaged forest the growth is usually a good deal slower, especially at first, and the rings are often so fine as to be scarcely distinguishable.

Coppice growth is more rapid for the first 50 or 60 years than seedling growth, and at 40 years of age sprouts are more than 52 feet high on an average and 7 inches in diameter.

A very striking feature of pignut hickory is the persistence of its growth. The diameter increase often shows little falling off even after 200 years or more. The old-growth hickory in the Cumberland Mountains and in the Mississippi Valley is usually between 200 and 250 years of age. Trees more than 300 years old are seldom found.

On account of its slow growth pignut is quickly overtopped and suppressed in an even-aged seed or coppice forest with chestnuts, oaks, and other trees.

Since the strongest and toughest wood is produced during the period of maximum growth, the quality of the wood from young second-growth hickory is usually superior to that from old trees. This is of the utmost importance in management, especially since more than two-thirds of the annual cut of hickory is used for spokes, handles, and other purposes for which large-sized material is not necessary.

Pignut reproduces more freely than any of the other hickories, largely, no doubt, because the nuts are not only very abundant but are, in addition, less attractive to squirrels and hogs than the sweet-kerneled nuts of shagbark or big shellbark.

Pignut is probably the most vigorous sprouter among the hickories. It is an extremely persistent sprouter in youth, and it retains the power to produce sprouts large enough for handle, spoke, and other small stock until it reaches 10 or 12 inches in diameter. As in all the other hickories, the sprouting is chiefly from the roots; the distance from the stump at which sprouting takes place increases with the size of the tree, but is seldom more than 8 feet, and usually within 3 feet. Exposed roots are more apt to produce sprouts than those under the ground. This is possibly the reason why sprout reproduction is very much poorer in the level river bottoms of the South, where annual inundations keep the roots covered with silt, than in the hilly regions where the soil is washed away.

Throughout its range, but especially in the hills of the Ohio Valley, thickets of young pignut are very common under older stands. Much of this is of sprout origin, mostly from small stumps, and is in many cases due to cutting saplings an inch or two in diameter for barrel hoops.

MANAGEMENT.

Pignut, like the other hickories, is adapted for management by either the simple coppice system or the selection system. For the production of small-sized material no method seems better than clear cutting and reproduction by sprouts. Since the sprouting capacity falls off rapidly with age, in order to secure the best reproduction the trees should be cut as soon as they are large enough to use. This method can be applied only to pure stands, either such natural ones as are frequent in old fields in Indiana and Ohio, or plantations.

In mixture with faster-growing oaks, chestnut, and other species, or when large-sized material is desired, the hickories should be managed by the selection system, to which they are peculiarly adapted through their ability to endure shade and to make good growth after suppression. Natural reproduction results readily from opening up the stand by the removal of mature trees.

Since slow-growing material is relatively weak and brash, the object of management should be to make the trees free themselves of branches early, and then, after a sufficient clear length has been obtained, to induce rapid growth. This may be accomplished by repeated thinnings at intervals of about 10 years. Pignut should be favored upon soils that are comparatively dry and sandy, big shellbark on moist or wet ground. Either pignut or shagbark should be favored on fresh, fertile soils: pignut, for the greater value of its wood; shagbark, where there is a market for its nuts.